

CLAIMS

1. A vibrator module adapted for use in a taper apparatus for advancing carrier tape having a plurality of compartments and for placing parts in the compartments, the vibrator module comprising:

5 a motor including an output shaft that rotates in response to operation of the motor;

an eccentric weight mounted to and rotatable with the output shaft, the eccentric weight causing the motor to vibrate in response to rotation of the output shaft and eccentric weight; and

10 a vibration transferring member interconnected with the motor and operable to transfer vibrations from the motor to the carrier tape to cause the parts to settle into the bottoms of the compartments.

15 2. The vibrator module as claimed in claim 1, wherein the vibration transferring member is a flexible strip of metal.

20 3. The vibrator module as claimed in claim 1, wherein the vibration transferring member is mounted to the taper apparatus and resiliently supports the motor in a cantilevered fashion.

25 4. The vibrator module as claimed in claim 1, wherein the vibration transferring member contacts at least one of the plurality of compartments in response to operation of the motor and transfers vibration from the motor to the compartments.

5. The vibrator module as claimed in claim 1, further comprising a resilient mounting structure supporting the motor, wherein the vibration transferring member contacts the carrier tape during operation of the motor.

5 6. The vibrator module of claim 5, further comprising an adjustable damping means for selectively varying the resiliency of the resilient mounting structure and for thereby adjusting the level of vibrations produced by said motor.

10 7. The vibrator module as claimed in claim 1, wherein the motor is an electric motor, the vibrator module further comprising a voltage regulator enabling selective adjustment of the voltage of electricity supplied to the motor, wherein the vibrations transferred to the carrier tape through the vibration transferring member may be modified to a selected level by adjusting the voltage with the voltage regulator.

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8. A part processing machine for depositing parts in compartments of a carrier tape, the machine comprising:

support means for supporting the carrier tape;

5 advancing means for advancing the carrier tape through the machine;

pick-and-place means for depositing the parts in the compartments of the carrier tape; and

vibrating means for vibrating the carrier tape to cause the parts to settle into the compartments.

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9. The machine of claim 8, further comprising inspecting means for inspecting parts in the carrier tape, wherein said vibrating means is positioned adjacent the compartment being inspected by said inspecting means such that said vibrating means may be actuated in response to a part being rejected by said inspecting means, wherein said inspecting means may re-inspect the part after said vibrating means vibrates the tape.

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10. The machine of claim 8, wherein said vibrating means includes a motor having a rotating output shaft and an eccentric weight on said output shaft for rotation therewith, wherein rotation of said output shaft and eccentric weight cause said motor to vibrate.

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11. The machine of claim 10, wherein said vibrating means further includes a vibration transferring member mounted to said motor and intermittently contacting the carrier tape at least during rotation of said output shaft and eccentric weight, the vibration transferring member transferring vibration of said motor to the carrier tape to settle the parts into the compartments.

12. The machine of claim 11, wherein said vibration transferring member includes a flexible strip of metal mounted to said support means and supporting said motor in cantilever fashion.

13. The machine of claim 8, wherein the carrier tape includes at least one flange, wherein the compartments depend downwardly with respect to the flange, wherein said support means supports the carrier tape by the flange, and wherein said vibrating means is mounted to the support means below the at least one flange and is operable to transfer vibration to the compartments.

14. The machine of claim 8, wherein said vibrating means includes an electric motor generating vibrations, the machine further comprising a voltage regulating means for permitting the adjustment of voltage provided to said motor such that the level of vibrations generated by said motor may be adjusted by adjusting the supplied voltage.

15. The machine of claim 8, wherein said vibrating means includes an electric motor generating vibrations, the machine further comprising a resilient mounting structure supporting said motor and an adjustable damping means for varying the resiliency of said resilient mounting structure and for thereby
5 adjusting the level of vibrations produced by said motor.

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A method for packaging parts in a carrier tape, the carrier tape being advanceable by a taper apparatus and including a plurality of compartments, the method comprising:

loading a part into one of the plurality of compartments;

activating a vibrator module to produce a vibration; and

transferring the vibration to the carrier tape to settle the part within the compartment.

17. The method of claim 16, wherein the act of loading includes

placing the part into one of the plurality of compartments with a pick-and-place vacuum head.

18. The method of claim 16, wherein the act of activating a vibrator module includes rotating an eccentric weight to produce the vibration.

19. The method of claim 18, wherein the act of activating a vibrator module further includes activating a motor to rotate an output shaft to which the eccentric weight is mounted such that the motor vibrates during operation.

20. The method of claim 19, wherein the motor is an electric motor, and wherein the act of activating a vibrator further includes adjusting the voltage of electricity supplied to the motor to adjust the level of vibrations generated by the motor.

21. The method of claim 19, wherein the act of transferring includes mounting a flexible member to the taper apparatus, supporting the motor with the flexible member in a cantilever fashion, and intermittently contacting the carrier tape with the flexible member during operation of the motor.

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22. The method of claim 16, wherein the act of transferring includes mounting the vibrator module on a resilient mounting structure to enable vibration, and intermittently contacting the carrier tape with a vibration transferring member during operation of the vibrator module.

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23. The method of claim 22, wherein the act of transferring further includes selectively damping the resiliency of the resilient mounting structure to adjust the level of vibrations being transferred to the tape.